



**Vaporless Manufacturing, Inc.
Quality Petroleum Equipment
Solutions for Over 20 Years**

**LDT-890 Leak Detector Tester
Installation & Operation Protocol
*October 1st, 2006***

Installing LDT-890

Turn power off, lock out, and tag out the submersible pump breaker. Proceed to the dispenser at highest point of elevation in the system. If there is no difference in elevation, go to the farthest dispenser. Secure the area with safety cones or other appropriate safety equipment.

Using an approved safety test can, hold the nozzle handle open and relieve any built up pressure and fuel into the test can.

Trip safety impact valve. Remove the plug from the test port of the impact valve. Install the 18-inch whip hose into the test port and connect it to the quick-disconnect of the test cabinet hose. Reset safety impact valve.

Check for Leaks

Set the 4-way valve on the test cabinet to Pressure Step Test. Turn the power on at the submersible pump breaker. Turn the dispenser pump lever on. Watch for pump to achieve full operating pressure as seen on the right hand gauge. Check all connections for leaks.

Purging Test System

Using the nozzle from the dispenser, run approximately two gallons into the test can to purge air from piping system, more if needed to insure there is no air trapped. Set 4-way valve to Dispensing Nozzle position. Purge LDT-890 test system completely of air. Turn the 4-way valve to Pressure Step Test. Note pump pressure on right hand gauge. *Record pump pressure (No. 1 on Test at Dispenser Form).*

Leak Test: Phase 1; Calibrating a leak at 10 PSI

Turn 4-way valve to 1. Calibrate G.P.H. While watching the left hand gauge, use the 2. Calibrate Pressure knob to adjust pressure to 10 psi. *(Turn knob counter-clockwise to increase pressure and clockwise to reduce pressure.)*

Using the 250 ml beaker (new) or the 150 ml beaker (old), time leak rate for 30 seconds. *(A 3-gallon per hour leak is equivalent to 95 ml in 30 seconds.)* To adjust the leak rate, use the 3. Calibrate Orifice knob. *(Turn knob counter-clockwise for larger leak rate and clockwise for smaller leak rate.)*

After adjusting the 3. Calibrate Orifice knob, the pressure on the left hand gauge will change. Reset the pressure back to 10 psi using the Calibrate Pressure knob. Time the leak rate for another 30 seconds. Repeat this process until the desired leak rate is achieved.

Set 4-way valve to Pressure Step Test.

Turn pump control handle off.

Record Gallons per hour rate (No. 2 on Test at Dispenser Form).

Note static pressure from right hand gauge. *Record Static Pressure on Test Form (No. 3 on Test at Dispenser Form).*

Bleed-back Test

Turn 4-way valve to Dispenser Nozzle. Drain pressure to 0 psi using large beaker. (Note: Piston Leak Detector may take 60 to 90 seconds to completely drain. All VMI leak detectors are Piston Leak Detectors.)

Record amount of product in Bleed-back Test with pump off (No. 4 on Test at Dispenser Form).

Step-through Time

Turn 4-way valve to Pressure Step Test. Turn pump control handle on. Using stopwatch, time the right hand gauge as it moves from 0 psi to full pump pressure. *Record Step-through time to full flow (No. 5 on Test at Dispenser Form).*

Turn dispenser off.

Turn 4-way valve to Dispenser Nozzle. Drain line pressure to 0 psi.

Leak Test: Phase 2, Does the leak detector search for and find a leak.

Turn 4-way valve to G.P.H. Test. Turn pump on. Needle on right hand gauge should rise to search pressure and remain indefinitely. This indicates the leak detector is functioning correctly. *Record Leak detector stays in leak search position “Yes X ” (No. 6 on Test at Dispenser Form).*

If gauge goes to pump pressure, leak detector has failed. Record Leak detector stays in leak search position “No X ” (No. 6 on Test at Dispenser Form. Record Pass or Fail (Leak Detector Test on Form)

Explanation of Leak Search Pressure Range

It is important to note that all mechanical leak detectors have three (3) different and distinct positions or steps the leak detector goes through during the test process. Those steps or positions are:

- 1. Pressurizing:** With the line pressure at zero (0), when the pump is started the leak detector will pressurize the line up to the leak search pressure.
- 2. Leak Search Pressure:** If there is a leak induced or created by test equipment, the leak detector will stay at or about this pressure, the gauge may even show the pressure falling off a bit. If the leak detector stays in this position it has detected the leak. The leak detector should not allow the pressure to continue on through to Full Pump Pressure. ****Leak Search Pressure is always less than Full Pump Pressure****
- 3. Full Pump Pressure:** The pressure the pump reaches after being turned on with no dispensing and no leak detection or the leak detector is in the full flow position. This pressure varies with the horsepower and the age (wear) of the submersible.

The pressure that the leak detector steps through from Leak Search Pressure to Full Pump Pressure (no leak) or stays in Leak Search Pressure (with leak) will vary by leak detector manufacturer, model of leak detector and the submersible Full Pump Pressure. The VMI series of leak detectors manufactured prior to February 1999 have a Leak Search Pressure of approximately 10 to 15 psi. The 99/LD-2000 and 99/LD-2200 series of leak detectors have a Leak Search Pressure of approximately 20 to 24 psi when used with a submersible having Full Pump Pressure of 30 psi. The lower the submersible pump pressure, the lower the Leak Search Pressure. Competitive leak detectors may have a Leak Search Pressure of approximately 10 to 15 psi.

Disconnect LDT-890

Turn power off, lock out, and tag out the submersible pump breaker. Turn 4-way valve to Dispenser Nozzle. Drain to 0 psi. Remove test apparatus and re-install test plug on impact valve.

Diagnostics

Failure to find a 3 gph leak could mean:

Bad leak detector (loose tolerances in metering system). REPLACE.

Too much line resiliency (Refer to Bleed-back Test). Maximum bleed-back for a VMI LD-2200 leak detector should be no more than 250 ml. Maximum bleed-back for a VMI 99 LD-2000 should be no more than 450 ml. VMI has special leak detectors available that will handle excessive bleed-back.

Thermal expansion occurs when cold fuel enters warm line. Test for thermal expansion by bleeding line pressure to 0 psi from bottom of dispenser. Wait 5 minutes. Record pressure. Wait 5 minutes. Record pressure again. If line pressure is climbing, thermal expansion is adding to the line pressure, causing the leak detector to open with a leak. You must wait for the product temperature to stabilize.

Slow Leak Detector

Normally a leak detector should take 2 to 4 seconds to go through leak search to full flow from the time the pump is turned on. If it takes longer than 4 seconds, here are some factors that may be occurring:

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Excessive line resiliency. The greater the resiliency, the longer it takes to fill the line and look for a leak.

There may be a small leak in the line, below the threshold of detection for the leak detector. Make sure the line is tight - holding pressure.

Small leaks in the delivery system, while they include line leaks, they may also include; packer 'o' ring leak back into the tank, leaking past the functional element or pump check valve. Note: VMI LD-2000 and LD-3000 leak detectors have their own integrated check valve. Contaminants may affect this check valve allowing pressure to leak by and back from the line to the tank. Leaking solenoid valve in a dispenser may pressurize the nozzle hose. Leak detectors may have a seal leak out through the vent line into the tank.

Leak detector may be bad or out of tolerance.

Thermal contraction occurs when warm product is pumped into a cold line. This most often occurs in the fall and winter months and can result in extreme line pressure loss, even to the point of causing the leak detector to reset. If a leak detector is extremely slow to step through, *thermal contraction* may be the cause. It may be identified by installing a pressure gauge at the impact valve of the farthest dispenser. Start the submersible, allow the leak detector to step through, turn the submersible off. Wait 5 minutes, note pressure and repeat the procedure. Again record the pressure. Repeat 4 times. Pressure drop should fall to a higher pressure each time. If pressure drop remains constant to the same pressure, suspect a line leak.

Leak detector does not reset when pressure is removed with the submersible off

Head pressure may cause some leak detectors to not reset. That is why a leak detector should always be tested from highest dispenser.